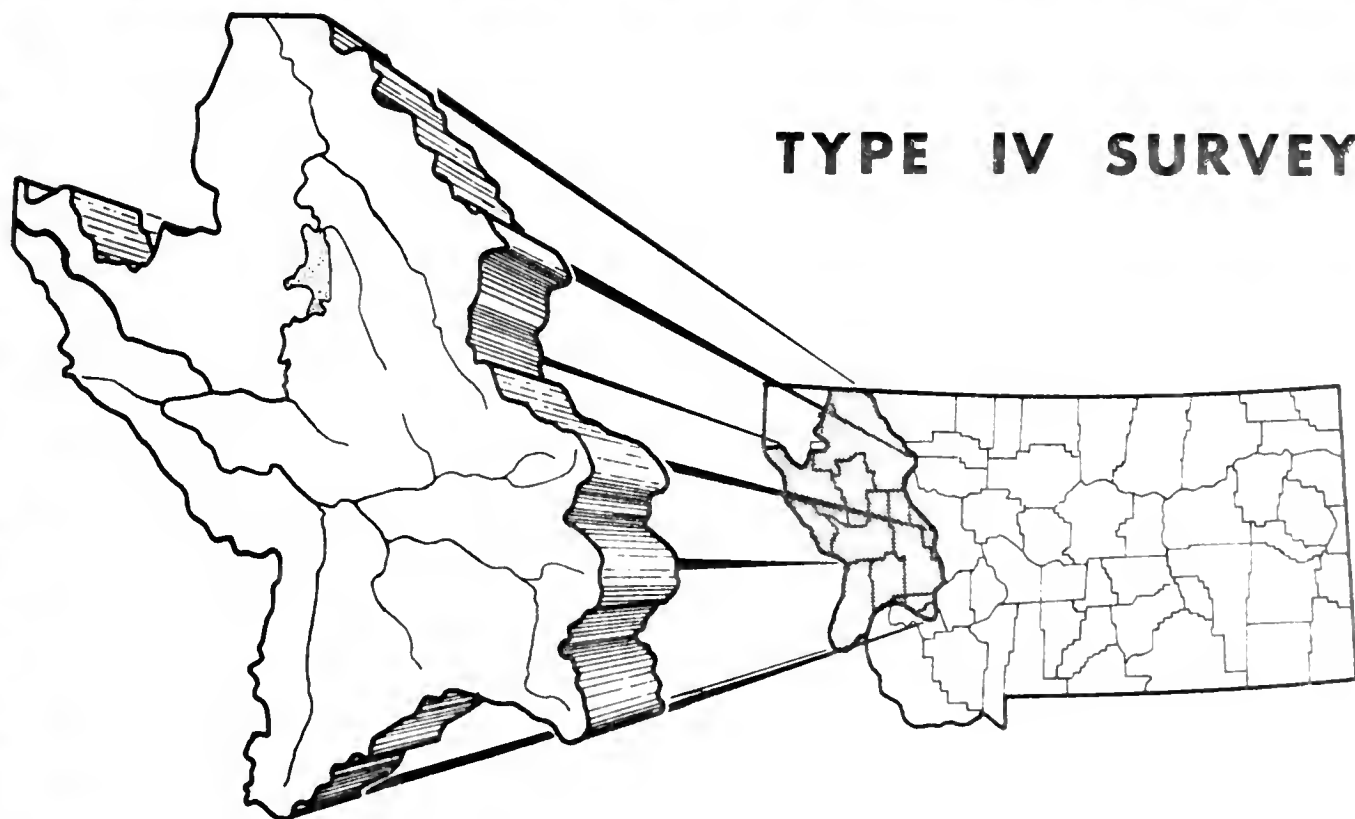


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PLAN OF WORK

CLARK FORK OF THE COLUMBIA RIVER BASIN



TYPE IV SURVEY

GOVERNMENT DOCUMENTS COLLECTION

★ UNITED STATES DEPARTMENT of AGRICULTURE ★

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P L A N O F W O R K

U. S. DEPARTMENT OF AGRICULTURE
cooperating with
MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION
in the
CLARK FORK OF THE COLUMBIA RIVER BASIN ^{1/}
(approximately 21,408 square miles)

MONTANA

INTRODUCTION

The Montana Department of Natural Resources and Conservation requested the U. S. Department of Agriculture to cooperate in a Type 4 survey of the Clark Fork of the Columbia River Basin. The Department of Agriculture has agreed to participate under the authority and provisions of Section 6 of Public Law 566, as amended. This is the second in a series of Type 4 surveys which are planned to be carried out in river basins in Montana.

The purpose of this survey is to outline a coordinated and orderly program for the conservation, development, utilization, and management of the water and related land resources of the Basin. This program will outline the role of the U. S. Department of Agriculture in cooperation with other federal, state, and local agencies. It will also outline the role of the Water Resources Division of the Department of Natural Resources and Conservation in achieving optimum use and development of the Basin's natural resources. The investigations will be conducted within the framework of the Columbia-North Pacific Region Type 1 Comprehensive

^{1/} This includes all of the area in Montana west of the continental divide except the drainage of the Mootenai River and its tributaries.

Survey and coordinated with the State Water Plan.

This Plan of Work defines the presently known objectives of the survey, outlines the nature of the studies, and sets out the duties and responsibilities of the USDA agencies and the cooperating State agencies involved in the survey. The Plan of Work will need to be reviewed and updated periodically to reflect changes in objectives and identification of problems, needs, and opportunities that occur during the study.

The U. S. Department of Agriculture needs information about problems, needs, and opportunities on watershed units concerning opportunities and need for development of water and related land resources under PL-566 projects. Information is also needed on outdoor recreational needs, Conservation District program needs, land treatment measures to be installed under ASCS programs, needs for Resource Conservation and Development projects, needs for FHA water and sewer developments, forestry needs on private lands to be installed under cooperative state-federal forestry programs, National Forest needs concerned with development and multiple-use programs, needs for reservoir or local protection projects, and rural electrification projects. These data will be used in multiobjective planning and development and use of natural resources. Local organizations can sponsor the development of these opportunities with assistance available from the Department under the provisions of the various land and water programs.

DESCRIPTION OF THE BASIN

Physical

The Clark Fork of the Columbia River Basin is made up of a related

contiguous group of drainages that are tributaries of the Clark Fork River. The study area includes all of Montana west of the continental divide except the Kootenai drainage in Lincoln County. The initial source of the Clark Fork River is along the continental divide in the Highland Mountains south of Butte, Montana. From this source it flows northwest to join the Columbia River. Enroute it picks up the flows of the Blackfoot, Bitterroot, St. Regis, and Flathead Rivers.

The Basin is about 170 miles wide from east to west and 240 miles long from north to south. It contains approximately 21,408 square miles. Elevations vary from about 2,175 feet above sea level at Cabinet Gorge Reservoir at the Montana-Idaho state line to 10,665 feet on the higher peaks in the Pintlar Wilderness. Precipitation varies from about 140 inches annually on a few high peaks to about 10 inches in the upper part of the Deer Lodge Valley. Water yields range from more than 98 inches annually in the mountainous parts of the Basin to less than 4.5 inches in the semi-desert areas. The average annual measured discharge of water at Cabinet, Idaho, is about 15,920,000 acre-feet. There are no significant diversions into or out of the Basin.

Of the 13,701,310 acres in the Basin, approximately 4,620,680 are privately owned; 598,900 are state owned; 616,633 are administered as Indian Trust lands; and the balance of 7,865,100 acres or 57 percent are federally owned lands.

The Burlington-Northern Railroad serves most of the Basin area. The Chicago, Milwaukee, St. Paul and Pacific Railroad serves the lower part of the Basin along the Clark Fork River. A branch of the Union Pacific Railroad serves Butte from the south.

The Basin is served by interstate highways 90 and 15 with considerable construction still underway. Federal highways 2, 10, 10A, and 12 cross the Basin from east to west and U. S. 93 crosses from north to south. The more important state primary highways include numbers 200, 28, 35, and 209. A good network of state secondary highways serves the habitated area.

Economy

The Basin falls in Office of Business Economics economic accounting area 153. The economy of the Clark Fork of the Columbia River Basin is based on forestry, mining, agriculture, tourism, outdoor recreation, and to a lesser degree on governmental and educational activities and associated supporting business and industrial activities. The forest products industry is the largest single income producer in the Basin. This industry provided over 171 million dollars to the economy in 1969 through pulp and paper, plywood, lumber, and other wood products. The more than 7,000 employees in the forest products industry receive an annual payroll of over 47 million dollars. Of the 10,767,000 acres of forested land in the Basin, 7,094,000 acres or over two-thirds are commercial forest land which provide the raw material to support the forest products industry.

Value-wise, copper is the most important metal produced in the area, followed by zinc, lead, silver, and gold. Non-metallic minerals include phosphorus, fluorspar, and quartz. Mining and concentration of ores is centered at Butte, while smelting and refining is conducted at Anaconda. Alumina is reduced to aluminum at Columbia Falls. Phosphate

rock is converted to agricultural phosphate and other products at Garrison and Roker.

Water resources inventories estimate that 424,200 acres are irrigated in the Basin. This acreage is located on about 2,800 farms. There are approximately 1,900 additional dryland farms and ranches for a total of about 4,700 farms. Livestock and livestock product sales comprise the principal source of agricultural income. Seed potatoes, small grain, and irrigated alfalfa are the most important crops grown in the Basin. Sweet cherries are produced around Flathead Lake. Agricultural processing plants and related industries are among the minor contributors to the economy.

The waters of the Clark Fork of the Columbia are subject to the provisions of the Boundary Waters Treaty, 1909, and the Columbia River Treaty, 1964, insofar as the treaties affect the Columbia Basin. The Columbia Interstate Compact, negotiated in 1954 by the states of Idaho, Montana, Nevada, Oregon, Utah, Washington and Wyoming, was never ratified by Oregon or Washington and ceased its activity in 1967. Basin-wide planning of water and related land resources is coordinated through the Pacific Northwest River Basins Commission, established by the President in 1967, at the request of the states and the Water Resources Council.

The Flathead Indian Reservation in Lake, Flathead, Missoula, and Sanders Counties is entirely within the Basin. This reservation is a designated redevelopment area under the Economic Development Administration.

The Basin contains over half of Glacier National Park and is surrounded by scenic mountain ranges. The tourist industry is an

increasingly important element of its economy.

The population of the Basin in 1970 was approximately 204,000 or 29 percent of the total Montana population.

STATUS OF WATER AND RELATED LAND RESOURCE PROGRAMS

There are 12 Conservation Districts that lie wholly or partially in the study area. These Districts, in cooperation with the Soil Conservation Service, provide technical assistance and guidance to cooperators in all forms of land and water conservation practices. Thirteen applications for assistance under Public Law 566 have been approved by the State of Montana and one application is pending approval. Of these, one PL-566 project, the Lower Willow Creek Watershed, near Hall, has been completed and another, the Cedar Creek Watershed at Columbia Falls, is nearing completion. The 1967 Conservation Needs Inventory indicates a potential of about 50 PL-566 projects in the Basin. These projects would provide flood prevention and watershed protection, agricultural water management, recreation, fish and wildlife, municipal and industrial water, improved water quality, and land treatment. The Bureau of Reclamation is currently studying an irrigation proposal on the Stillwater River in Flathead County.

The Bitterroot Resource Conservation and Development Project, in Ravalli, Missoula, and Mineral Counties, has several water and land developments under construction, most of which are associated with improving irrigation efficiencies.

There are 424,200 irrigated acres in the Basin with an additional 25,695 acres irrigable under present systems. Most of the irrigated land in the Basin was developed under private group or individual

ditches with many of the larger groups reorganizing into irrigation districts. The Flathead Irrigation Project was built over a period of years with the combined efforts of the Bureau of Reclamation and the Bureau of Indian Affairs. It contains 102,338 irrigated acres on the Flathead Reservation, mostly in Lake County.

Distribution of irrigation by subbasins include: Big Blackfoot, 29,560 acres; Bitterroot, 111,102 acres; Flathead, 159,609 acres; and Clark Fork mainstem, 123,907 acres.

There are many storage reservoirs in the Basin. Storage reservoirs with over 15,000 acre-feet capacity include:

Name of Dam	Stream Drainage	County	Acre-Feet Capacity
Georgetown	Flint Creek	Deer Lodge	31,042
Flint Creek Dam	E.F. Rock Creek	Granite	16,040
Painted Rocks	W.F. Bitterroot	Ravalli	32,362
Lake Como	Rock Creek	Ravalli	36,693
Little Bitterroot	Little Bitterroot	Flathead	26,000
Ashley	Ashley Creek	Flathead	20,000
Hungry Horse	S.F. Flathead	Flathead	3,468,000
St. Marys Lake	Dry Creek	Lake	16,000
Pablo	Runoff	Lake	29,600
Kerr Dam	Flathead	Lake	1,219,000
Thompson Falls	Clark Fork	Sanders	69,400
Noxon	Clark Fork	Sanders	380,000

The Bureau of Indian Affairs has an active soil and water conservation program on Indian Trust lands.

Approximately 7,035,800 acres, 51 percent of the Basin, are administered by the U. S. Forest Service. All of the Flathead and Lolo, most of the Deer Lodge, and the Bitterroot National Forests are in the study area along with lesser areas of the Kaniksu, Helena, and Kootenai National Forests. Of this, 1,161,900 acres are classified as Wilderness or Primitive Areas. All Wilderness and Primitive Areas are managed under the provisions of the Wilderness Act, Public Law 88-577 (1964). The other lands under Forest Service administration are managed for the sustained-yield multiple-use benefits of range, recreation, timber, water, and wildlife.

The eastern rim of the Basin is formed by the continental divide from Lost Trail Pass to the Canadian border. The western rim is formed by the Bitterroot Range and the divide between the Kootenai River drainage and the Flathead-Clark Fork drainage in Montana.

Approximately 152,300 acres of public domain land in the Basin are administered by the Bureau of Land Management. BLM has an active soil and water conservation program.

The State of Montana, several cities, counties, conservation districts, and irrigation and drainage districts have active programs underway for the conservation, development, and improvement of the use of water and related land resources. These activities include such things as preparation of the overall Montana State Water Plan, computerization of waterflow records, construction of drainage and improved irrigation systems, groundwater surveys, development of municipal water supplies and upgrading of sewage disposal systems and recreational developments.

PROBLEMS AND NEEDS

The presently identified water and related land resource problems and needs of the Basin involve a number of physical, social, and economic problems. If additional problems and needs are identified during planning, they will be added to the study. Problems currently identified for study are as follows:

1. Flood Prevention. Average annual flood damages on rural, urban, and forest areas in the Basin are estimated at \$314,000. Urban areas experiencing the greatest flood damages include Kalispell, Deer Lodge, Missoula, and Columbia Falls.

Damages to crops, pastures, buildings, recreational facilities, trails, roads, and bridges have occurred on about 78,400 acres on tributaries and along the mainstem of the Clark Fork above Missoula, the Blackfoot, the Bitterroot, the Little Bitterroot, the St. Regis, the Flathead, the Swan, the Jocko, and the Stillwater Rivers. Damages on areas identified as needing project action occur on about 29,900 acres of agricultural land and 140 acres of urban land. Damages on public lands have occurred in the Flathead and Lolo National Forests.

Crop damages are commonly associated with disrupted irrigation service caused by flash floods destroying irrigation canals, diversion structures and head gates and from sediment deposition in the canals. Such damages occur along the Bitterroot, the upper Clark Fork, the Jocko, and the Little Bitterroot Rivers. Flood hazard areas need to be identified.

2. Land Resource Use, Availability and Watershed Management. There is a need for multipurpose management of grazing and forested land to

improve hydrologic conditions for flood reduction and erosion control and to increase production of goods and services. About 1,082,000 acres out of the 1,600,000 acres of private and state-owned rangeland need additional land treatment. In some cases, management to increase water supply for domestic livestock, municipal and industrial water supply, and other uses is needed. Needs for recreation and wildlife must be considered along with the need for food and fiber in working for proper land management. There is an increasing shift of land use from agriculture to rural residences in areas near population centers. The problems thus created need to be considered in planning and may indicate a need for land use regulation.

3. Erosion. Streambank erosion is particularly severe along the Bitterroot and Jocko Rivers and Lolo Creek. Wind erosion is a minor factor. Sediment is deposited in irrigation canals and ditches, irrigation storage reservoirs, and drainage ditches.
4. Water Quality. Pollution is becoming a serious problem in Flathead Lake, Georgetown Lake, Whitefish Lake, and other lakes as summer home concentrations increase. Stream pollution and low flows are a threat to the fishery resources in several areas. Population pressures, industrial expansion, increased irrigation and recreation may tend to increase pollution problems within the Basin. The maintenance of high quality water may be difficult.
5. Agricultural Water Management.
 - A. Irrigation. Most of the streams supplying water for irrigation originate in the high mountains. Spring snowmelt results in peak flows during April, May, and June. Streamflows drop off

fast after the spring snowmelt is over, causing irrigation water shortages during July and August, particularly on the smaller streams. On the Bitterroot drainage 43,000 acres show a shortage of 50,000 acre-feet; on the upper Clark Fork, 18,000 acres are short 40,000 acre-feet; on the lower Clark Fork, 4,000 acres are short 2,000 acre-feet; and on the Flathead, 127,000 acres are short 11,000 acre-feet of late season water. A need exists for identification of all feasible upstream storage sites to assure adequate supplies of irrigation water.

Many irrigation systems need reorganization and consolidation with improved diversions and head gates, measuring devices, system enlargement, and adequate provisions for handling flood flows from small drainages intersected by irrigation canals. Lining, realignment, and general improvement of many conveyance systems are needed.

Opportunities to irrigate new lands exist in many areas. Potentially irrigable acres include 67,000 acres on the Bitterroot, 296,000 acres on the upper Clark Fork, 171,000 acres on the lower Clark Fork, and 458,000 acres on the Flathead drainages. These lands need to be identified, a water source determined, and the effect on overall water supplies evaluated.

- B. Drainage. Approximately 80,000 acres of crop and pastureland in the Basin have a wetness problem associated with improper irrigation, canal seepage, and inadequate drainage outlets.
- C. Livestock water. More development is needed for better range utilization.

6. Rural, Domestic, Municipal and Industrial Water. Shortages of municipal water are problems in Hamilton, Drummond, Deer Lodge, and parts of Missoula.
7. Recreation. Recreation and tourism are important sources of income. Hunting, fishing, boating, water and snow skiing, camping, mountain climbing, and sight-seeing are some popular activities. Other attractions in and near the Basin include ghost towns, the National Bison Range at Moiese, Hungry Horse and Libby Dams, Flathead Lake, archeological sites, and deposits of agate, petrified wood, fossils and sapphires. Much of the outdoor recreation is dependent upon the numerous mountain streams, lakes, and storage reservoirs of the area. Many tourists enjoy these recreation opportunities enroute to Glacier National Park. The Basin includes large areas of national forests which are extensively used for a variety of outdoor recreation activities. More than 8 percent of the Basin is classified as wilderness or primitive areas which provide unique self-dependent wilderness experiences. A study is currently considering the classification of parts of the upper Flathead River as a Wild and Scenic River. Other areas are being considered for wilderness classification.

The overall impact of national parks, national forests, and other prime recreation areas on the surrounding areas can be seen in the development of businesses that are heavily oriented toward providing services to the vacationing public.

Increasing demand for outdoor recreation has created a need for additional developments such as swimming, boating, and water skiing facilities, campgrounds, picnic areas, ski

areas, and vacation lodging facilities. This rapidly increasing demand coupled with the vast recreational resources of the area offer an opportunity for income-producing recreational developments. Additional recreational opportunities need to be considered in planning water and related land resource developments.

8. Fish and Wildlife. The Basin is widely known for its outstanding big game hunting. Deer, elk, bear, moose, mountain goats, and Bighorn sheep and a wide variety of game birds and small animals are hunted. Fishing opportunities for trout and other species are abundant and constitute a very important resource. The demand for fishing and hunting is increasing, and there is a need to protect existing resources and to develop opportunities for additional fishing and hunting wherever possible. In addition, the non-game and rare and endangered species of wildlife should be considered in the overall studies for their relative importance, both economically and esthetically.
9. Socio-economic. People in some areas in the Basin have depressed incomes. Soils and topography that are poorly adapted to irrigation, late season water shortages and small farms contribute to these conditions in several areas. The Flathead Indian Reservation is designated as a low-income area. A need exists to determine the extent to which the water and related land resources may be utilized and developed to help alleviate these problems.

There are opportunities for expanding the utilization and processing of forest products and development of known mineral resources. All opportunities to broaden the economic base need to be identified in order to provide employment opportunities in new and expanded industries and associated service enterprises that would result from these developments.

10. Upstream Water Management. Most of the headwater streams in the region drain lands with stands of commercial forest timber. Logging of these stands on a sustained yield basis is vital to the economic stability of the Basin. The combination of timber harvest and unstable soils in headwater streams increases the chances for degradation of water quality, primarily through sedimentation and increased streambank and channel erosion. The forested areas also afford opportunities for managing watersheds to yield more water and to regulate to some extent the length of the runoff period through carefully planned and managed harvest operations. Hydrologic conditions of forest lands, which affect erosion, sediment production, and runoff, can be improved. Measures needed are sustained yield management, improved logging methods and practices, reforestation, and other cultural practices.

OBJECTIVES AND SCOPE OF THE STUDY

The purpose of the U. S. Department of Agriculture's participation in the Clark Fork of the Columbia survey is to gather information which will provide a basis for multiobjective planning and effective coordination of USDA programs for flood prevention, watershed management, erosion control, water quality improvement, agricultural water management, other water management, recreational development, fish and wildlife development, socio-economic development, and upstream water management, with the related activities of local, state, and other federal agencies.

The objectives known at this time are based on requests for information by the State of Montana and needs identified by the Columbia-North Pacific Framework Study and the Conservation Needs Inventory.

These objectives will be augmented during the course of the different phases of the survey by additional needs and desires identified by the local people and their representative organizations. Current objectives include the following:

1. Flood Prevention: The study will identify potentials for decreasing the flood damages through projects, floodplain regulation, and other measures compatible with the multiobjective approach.
2. Land Resource Management: Potentials for accelerating improved management will be identified and evaluated in respect to land use trends and needs. Particular attention will be given to areas shifting from agricultural to residential uses.
3. Erosion: Areas of present and potential severe erosion will be evaluated in terms of corrective and preventive measures.
4. Water Quality: Pollution abatement and prevention in areas of increasing industrial development, recreational use, and expanded rural residency will be studied in view of potential recommendations for new legislation.
5. Agricultural Water Management:
Irrigation. Potential upstream and offstream storage sites on drainages with surplus spring runoff and shortages of late season water will be identified and evaluated in terms of potential for providing full season supplies. Irrigation distribution and on-farm efficiencies will be examined to determine the practical potential for reducing over-diversion of water. The physical and economic potential for developing additional irrigable lands will be examined in areas where such development is practical and needed to stabilize and augment the economy.

Drainage. Wet areas will be evaluated in terms of potential problem solution through management, land treatment, and project measures.

Livestock Water. Range management and land treatment associated with livestock water development will be studied and recommendations made to the land managing agencies.

6. Municipal and Industrial Water: Projected needs and potential sources of M&I water will be evaluated to provide the people of Hamilton, Drummond, Deer Lodge, and Missoula with alternative choices for domestic water development.
7. Recreation: The recreation resource potentials of the entire Basin will be evaluated in terms of balancing the increasing demand with resource and facility development while minimizing any deterioration of the recreation experience or environmental quality. The income potentials of recreational development will also be identified.
8. Fish and Wildlife: Potentials for enhancing the winter range for big game animals will be evaluated as part of the land use management. Stream flow preservation and improvement will be evaluated in the spring runoff storage investigation and irrigation efficiency studies. The preservation and enhancement of rare and endangered species and other non-game animals and birds will be considered in evaluating all water and land resource management and development.
9. Socio-economic: Probably the most importantly felt need in the Basin is for the identification and evaluation of opportunities that will improve basin-wide economic conditions. Particular investigation will be directed toward the lowest income areas.

10. Upstream Watershed Management: Critical erosion and water supply areas will be evaluated and resource management recommendations made to preserve and enhance the quality and quantity of water yields while still providing for multiple use of the other resources of the watersheds.

MAJOR ACTIVITIES OF THE SURVEY

The following chart portrays a conceptual overview of the plan formulation process utilizing the multiobjective approach. While the overall planning process is logically a continuing operation, it lends itself to classification into four interrelated and reiterative phases.

Phase 1:

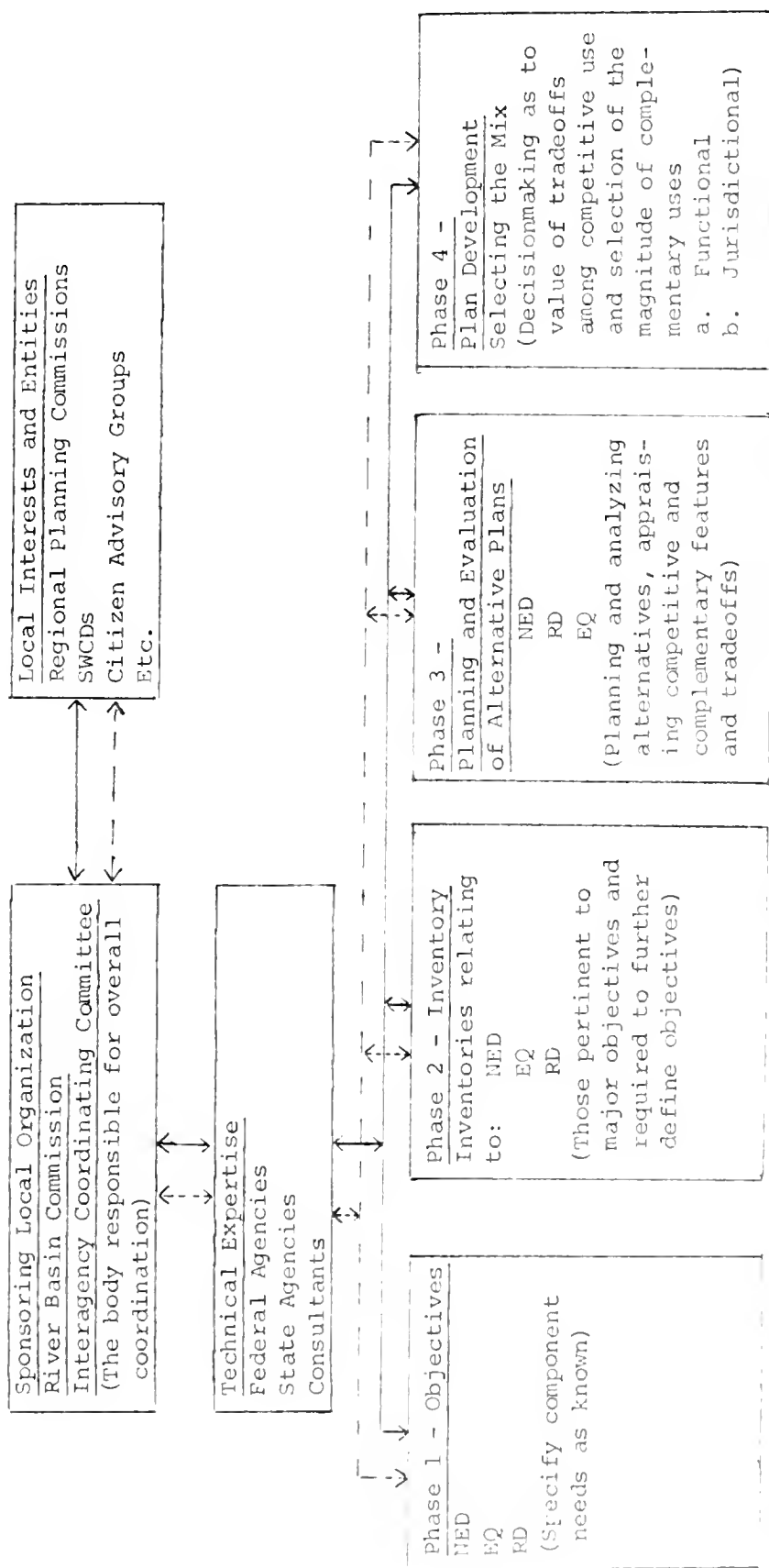
Activities. The first phase involves the initial identification of the problems, needs, desires, and opportunities concerned with water and land resources and the initial definition of project objectives.

Procedures. In the first phase of plan formulation, sufficient time will be spent with sponsors, local governmental units, and local people to gain a better understanding of the types of problems which exist and the needs and desires of all interests concerning economic growth and environmental considerations. These problems, needs, and desires will be examined with the sponsors and local interests to the degree that they can be given some definition to show how they relate to the major objectives of national economic development, environmental quality, and regional development for improving the social factors.

The first phase is necessary because it:

1. Establishes the basis for the type and kind of resource inventories to be made.

PLAN FORMULATION Conceptual Overview



NED = National Economic Development
EQ = Environmental Quality
RD = Regional Development

2. Encourages planners to consider some of the alternatives to be examined in detail at a future time.
3. Provides a basis for writing a plan of work and developing a detailed work outline that is responsive to meeting sponsors' and local objectives.
4. Initiates the information and education process among and between participants.

It is contemplated that this work with sponsors will be accomplished through a series of local meetings throughout the Basin. This will necessitate collection and analysis of certain secondary data prior to the meetings.

Examples of the type of data that will be pertinent to accomplish the setting of objectives with sponsors are:

1. Conservation Needs Inventory
2. Assessment and framework studies that are in process or completed.
3. Census data on employment, income, population.
4. State recreation plans.
5. State demographic material by counties on employment, unemployment, incomes, industries, etc.
6. Ground and surface water studies.
7. Stream classification information.
8. Flood hazard studies.
9. Wetland classification studies.

Availability and analysis of such data as listed above will provide an opportunity to discuss problems, needs, and desires by the various

components under the national economic development (NED), environmental quality (EQ), and regional development (RD) objectives.

Phase 2:

Activities. In the second phase the multiobjective planning concept will be carried out in an inventory of the land and water resource features pertinent to meeting the objectives developed in the first planning phase. This calls for a selective inventory of the quantity and quality of water and land resources of the study area and an appraisal of opportunities for further use of these resources. Included will be an examination of resource limitations for certain uses.

This planning phase calls for: (1) an inventory of existing resources of the study area in terms of (a) capability of the resources to meet needs without any planned project action and (b) capability of the resources to meet needs with institutional limitations alleviated or productivity enhanced through management plans alone; and (2) an analysis of the capabilities of resources to meet objective needs with planned project action.

So that decision-makers may better appraise and refine objectives, the complementarity and competitiveness of resource use and demand will be considered. This will require a close examination of the objectives, the component needs and elements of the objectives, and a mutual understanding with the decision-makers, local people, and other entities regarding which resources will be inventoried.

Work to be done by the USDA agencies will be conducted with an awareness of the provisions of federal and state laws and regulations

and of interstate compacts regarding the allocation of water and existing rights to the use of water and activities necessary to accommodate the study objectives.

The subactivities include:

1. A water budget analysis for the major subbasins will be used as a tool in identifying areas of surplus water, areas of water shortages and physical opportunities to make better use of water and related land resources.
2. Identification of feasible water storage sites.
3. Identification of major obstacles and institutional restraints to achieving an optimum pattern of water and related land resource development.
4. Identification of opportunities for water yield improvement from upstream watershed management (quantity, quality, timing of flows and weather modification).
5. Appraisal of the agricultural rural community and upstream watershed and vegetative needs and furnish information that will provide a basis for preparation of a plan for the coordinated and orderly development, management and use (including alternatives), for the water and related land resources to satisfy those needs.
6. Inventory and rate esthetic, natural environmental and cultural features and potential wild and scenic rivers and wilderness areas. Consideration will be given to protection of areas of natural beauty that may be impaired by resource development, increased rural residences and urban sprawl.

Procedures. The U. S. Department of Agriculture will develop data needed for Departmental and State use as described in the objectives. This

information will be available for use by the State in preparation of its plan for the overall development, management and use of water and related land resources in the Basin.

The major elements to be undertaken by USDA will include:

1. Economic base studies and projections of economic development at the earliest possible date during the study. Quantitative projections will be made for the years 1980, 2000, and 2020 and translation of such projections into needs for water and related land resource uses. Projections will consider national and Basin-wide (regional) needs.
2. Appraisal of water supplies both as to quantity and quality.
3. Appraisal of the availability and interrelationship of related land resources.

Phase 3:

Activities. In Phase 3 a first requirement is to determine the general types of alternatives to be developed. The 1972 OBERS Baseline Projections will be used as a framework for estimating the economic effects of specified water constraints and the economic implications of alternative programs for developing and managing the water and land resources of the area. These baseline projections will provide a framework of demand for food and fiber and related requirements for land and water resources. Alternative projections, representing other levels of population and of resource development, will be analyzed in terms of their impacts on national economic efficiency, environmental quality, regional development, and social welfare. A sensitivity check will be made to ascertain the extent to which component needs will vary significantly. Characteristics of present and future problems and the general approaches that appear appropriate for their solution will be described. Alternative

plans will include projects and program elements which are feasible and should be initiated in the next 10-15 years. Appraisal of alternative plans will determine land and water resource developments that should be installed and programs that should be initiated within the next 10-15 years. State and local interests will indicate type, location, scope, and priority of development.

Alternative solutions under USDA programs will be evaluated to the extent that reasonable estimates of the feasibility, from local and national viewpoints, of works of improvements can be made. Evaluation of other projects will be requested and, as available, will be used in alternate plans. Physical and economic effects of alternative solutions will be appraised to the extent necessary to satisfy Basin residents and other decision-makers of the soundness of the proposed general solutions.

Procedures. The number and types of alternative plans to be developed will be determined by applying the following steps:

- a. Array component needs that are essentially complementary.
- b. Group component needs and the elements of a plan to satisfy those needs that are essentially in harmony.
- c. Identify alternative means of meeting each of the component needs to be included in an alternative plan.
- d. Formulate alternative plans based on the set of complementary component needs and plan elements. Initial consideration will be given to orientation of alternative plans to fulfill the component needs for one of the multiobjectives. Additions will be made for the component needs of other multiobjectives, provided that their addition to a given plan does not significantly diminish the contributions of the overall plan to the first objective. Alternative plans will be

analyzed to reveal the extent of any shortfalls against other multiobjectives. Repeat the process until sufficient alternative plans have been formulated so that at least one plan satisfies each specified component need of the multiobjectives.

One alternative plan will be formulated to emphasize contributions made to the component needs of the national economic development objective. Another alternative will be formulated to emphasize contributions toward the component needs of environmental quality. Another alternative will be formulated to emphasize local or regional objectives.

Phase 4:

Activity. Phase 4 will make use of multiobjective accounting to select the recommended plan for the Basin. The plan will be of sufficient scope to identify the type, location, scale, and priority of developments to meet future needs for goods and services and alleviate present and emerging economic and environmental problems.

Procedure. Under multiobjective accounting each alternative plan developed during Phase 3 will be appraised in terms of its physical and economic impact in relation to the components of the NED, EQ, and RD objectives and the effects on social factors.

Plans for the use of water and land resources will have benefits and costs that affect more than one of the multiobjectives.

There will be beneficial and adverse effects on national economic development, environmental quality, regional development, and social factors accounts. These will be measured in quantitative units or qualitative terms appropriate to a particular objective. The multiobjectives are not mutually exclusive with respect to beneficial and

adverse effects in one or more of the multiobjectives. All beneficial and adverse effects will be documented in a system of accounts relative to the inherent claim of objectives. Final decisions as to the recommended plan will be made by considering the differences among alternative plans as to their beneficial and adverse effect on all objectives.

GENERAL PROCEDURES FOR THE SURVEY

The U. S. Department of Agriculture participation will be carried out through examination and analysis of existing source material and through reconnaissance-type investigations. These will involve only the broadest significant classifications of land cover, soils, geologic information and related data. Optimal use will be made of secondary data. The intensity of the watershed investigations will approximate that followed in making preliminary investigations of a Public Law 566 project and will include multiobjective concepts. Economic studies will include an early analysis of the volume and value of agricultural output to aid in appraisal of present and long-term needs. The 1972 OBERS projections will represent a base line for the study area. Alternative projection levels will be considered ranging from a high level projection represented by the productive capacity of land and water resources of the region to intermediate levels. Estimates of gross farm income, employment, and the use of rural lands will be derived from the analysis of historical and projected agricultural production and projections of non-agricultural uses of land.

The revised 1967 Conservation Needs Inventory will be used as a starting point to determine land use, erosion, soil distribution, land

capabilities, problems, and treatment needs on crop and pasture lands. Forest resource data will be compiled from Forest Survey data of the Forest Service, in cooperation with the State Forester.

Linear programming will be used as an aid in projecting future land use patterns and estimating the impacts of alternative developments. Economic base data including present trends and projections on Basin population, income, employment, land use, agricultural and forest production, yields and value will be disaggregated from the Columbia-North Pacific Basin Type 1 Report and other data. Projections for years 1980, 2000, and 2020 will be made. An Economic Base Study Report will be prepared at the earliest possible date so that it will be available for use in the rest of the planning effort.

Recreational data will be obtained from federal and state sources. An inventory of existing recreational facilities and the potential for outdoor recreation development will be made with state and local assistance. Structures with potential for recreational development will be evaluated in light of water resource development needs.

Limited field surveys will be made of selected valley and channel cross-sections in potential PL-566 watersheds and the critical downstream floodplains within the Basin. These cross-sections will be used in hydraulic and flood damage analyses.

USGS and other topographic maps and aerial photographs will be used to identify potential structure sites. When 7-1/2 minute quadrangle maps are available, storage capacities will be determined from

them. Preliminary storage-frequency curves will be developed and used for estimating storage capacity needed for the required water supply. Field reconnaissance will be made of the sites.

An appraisal of potential PL-566 watershed projects and opportunities for other USDA programs will be made to determine the extent to which these programs may meet the present and projected water and related land resource needs of the Basin.

The forest resources, their present use, volume and values of output, and impact on employment will be determined. An estimate of the future need for timber, range, recreation, fish and wildlife, and water yields will be made.

Data on present and projected urban and industrial uses of water will be obtained from other governmental units. The Department will consult and collaborate with these governmental units in the hydrologic study and analysis in determining yield, supplies, and projections of water availability for urban and industrial use.

USDA AGENCY RESPONSIBILITIES

Each agency will have leadership responsibility for designated aspects of the survey. These responsibilities will be in accordance with the following description of agency responsibilities:

SOIL CONSERVATION SERVICE

The SCS has overall responsibility for programming and coordination of Department agencies in the conduct of the survey and has specific responsibility for:

1. Providing the chairman of the Field Advisory Committee.
2. Assisting in an appraisal of water yield and consumptive use on present and potential developments.
3. Making a physical appraisal of soils and land suitability on non-federal lands for present and future uses.
4. Making a physical appraisal of agricultural and rural water problems, resource development needs and opportunities for projects and project-type developments on private nonforested lands.
5. Making limited field surveys of selected valley and channel cross-sections in potential PL-566 watersheds and critical downstream floodplains.
6. Determining the extent of floodwater, sediment deposition and erosion damage, including evaluation of floodwater and drainage damages and benefits and evaluating benefits from multiple purpose water developments.
7. Making a field investigation of possible Public Law 566 projects and a determination of their relationship to other existing and potential water and related land resource developments, including a feasibility estimate.
8. Determining land treatment and water management necessary to control erosion, prevent pollution, and provide for proper use of nonforested non-federal lands.
9. Cooperating and consulting with other agencies on land and watershed management programs.
10. Appraising present and potential recreational opportunities on all non-federal lands.

11. Assembling, reviewing, and evaluating data gathered, assisting in plan formulation and in the drafting of supplementary material for consideration of the Field Advisory Committee.
12. With Forest Service and Economic Research Service participating, will have primary responsibility for the preparation of the Type 4 River Basin Survey Report.
13. Contribute to the economic base study and in its interpretation and application in the study.

ECONOMIC RESEARCH SERVICE

The Economic Research Service is responsible for Basin-wide economic aspects and elements of the USDA program in river basin planning. ERS, in cooperation with the other USDA agencies and the State of Montana, will compile economic data and make economic analyses, at varying levels of intensity, relating to the agricultural sector and its use of land and water resources. This will include the following:

1. Description of the economic base of the area and the trends in its development, stressing the individual and combined effects of water and related land resource uses in relation to institutions within the area. Preparation and early completion of a report for study use on the economic base analysis and preliminary projections.
2. Analysis and projection of economic activity in the agricultural and related sectors with consideration of demand for agricultural goods and the interaction of demand and supply of resources.
3. Analysis of the economic consequences of resource related problems such as floods, drought, insufficient irrigation water supplies.
4. Analysis of economic and institutional factors involved in the

formulation of a coordinated plan and an analysis of alternative courses of action for water and related land resource use and development. Special reference will be made to the social objectives represented by the four-account multiobjective system of planning.

5. Adapt available projections of the demand for and value of significant types of water-oriented outdoor recreation opportunities to the various areas in the Basin.
6. Identification and analysis of institutional constraints to water and land resources development.
7. Assembling, reviewing, and evaluating data gathered, assisting in plan formulation and consideration of relevant alternatives, and in the drafting of a report and supplementary material for consideration of the Field Advisory Committee.

FOREST SERVICE

The Forest Service is responsible for:

1. Identifying the nature and quantity of measures required on national forest and state and private forest lands for watershed protection, flood prevention, recreation, water yield improvement, fish and wildlife, and pollution control.
2. Cooperating with other services and agencies in estimating the impact of recreational development potential on federally administered lands as it may supplement, augment, or make more effective proposed or potential recreational developments or activities on national forest and state and private forest lands.
3. Cooperating with the State Foresters and Conservation Districts in determining the needs for measures for watershed protection, flood prevention, recreation, water yield improvement, fish and

wildlife, pollution control, and other water uses on state and privately owned forest lands.

4. Determining present use and probable future needs for water on national forest and state and private forest lands for various purposes, including administrative uses, industrial and other commercial use, livestock and agriculture, recreational use, and fish and wildlife habitat and appraising water needs of forest-based industries.
5. Cooperating with other agencies and the Office of the State Forester in reviewing and evaluating available secondary physical data, published and unpublished, concerning soil and water resources of forested lands, and to collect additional related basic physical data needed for the survey.
6. Collaborating with the SCS and the State in defining the water yielding areas and their characteristics, together with their water yields and contributions to floodwater and sedimentation problems.
7. Analyzing the forest resource sector of the economy.
8. Assembling, reviewing and evaluating data gathered; assisting in plan formulation and in the drafting of a report and supplementary material for consideration of the Field Advisory Committee.
9. Contributing to the economic base study and in its interpretation and application in the study.
10. Appraising prospective economic impacts of formulated development plans and alternatives available on agricultural, rural, and related sectors of the economy.

11. Collaborating with other land management agencies to determine present and future cover conditions and treatment needs for all forest and mountainous wild lands.

ACTIVITIES OF COOPERATING ORGANIZATIONS

LOCAL

Local entities including conservation districts, irrigation and drainage districts, city-county planning boards, regional planning associations, other local authorities and individuals will:

1. Provide the initial identification of problems, needs, and opportunities related to land and water resource use and development.
2. Provide supplementary inventory inputs, as available, pertaining to soil classification, soil and water management needs, farm plan development, local economic considerations, group facility developments, small livestock and irrigation water developments, present and proposed recreational use and developments.

FEDERAL

Data and information available from other federal agencies will be utilized to the fullest extent possible. Land classification surveys, economic data and hydrologic studies and project plans of the Bureau of Reclamation, Corps of Engineers, and the Bureau of Indian Affairs will be reviewed and appropriate use and coordination made with information obtained from other sources. Reports of the Environmental Protection Agency will be reviewed and studied with regard to their relationship to the survey area and the use and development of its water and related land resources. Climatological records of the Weather Bureau will be used, as will hydrological records and studies of the Geological Survey.

The recreation needs of the area and recreation planning will be developed in consultation with representatives of the Bureau of Outdoor Recreation and information from their recreation plans incorporated in the study. The National Park Service will be consulted in regard to fish and wildlife needs and problems. Land use and management needs and plans of the Bureau of Land Management and the Bureau of Indian Affairs will be coordinated with field observations and information from other sources. It is expected that assistance from the Farmers Home Administration will be required to establish the need for rural community water supply and sewage improvements. The Rural Electrification Administration or its borrowing constituency may be consulted in relation to development in rural areas.

STATE

The cooperating state agencies will develop policies and procedures for the conduct of their part of the survey.

The Water Resources Division of the Montana Department of Natural Resources and Conservation will assume responsibility for the following aspects of the survey:

1. Arrangements for cooperation as needed with the other than USDA federal agencies, state, and other than agriculturally oriented local agencies and provide for liaison with these agencies.
2. The compilation and analysis of irrigated and irrigable land data and stream runoff information.
3. Compilation of information relating to water rights, the present use of water, and stream depletion resulting from such use.

4. Recommend opportunities for potential use of water and related land resources.
5. Preparation of summaries showing present status of water resource development and potential development.
6. Coordinating the assisting efforts of state agencies providing data for the survey, including the Departments of Fish and Game (which includes recreation), Health, Agriculture, Lands, and the State Department of Planning and Economic Development, State Conservation Commission, and Office of the State Forester.
7. Determining the need for additional streamflow and precipitation information and making arrangements for its collection.
8. Making arrangements with the Cooperative Agricultural Extension Service for assistance on education and information matters in acquainting people with the objectives of the survey.

DIVISION OF ACTIVITY RESPONSIBILITIES

	<u>Primary</u> ^{1/}	<u>Assisting</u>
I. Pre-Inventory		
A. Plan of Work and Work Outline	All	
B. Review of Secondary Data	All	
C. Base Map Preparation and Area Measurement	SCS	FS, State
II. Initial Step in Plan Formulation		
A. Setting and Recognition of Objectives and Component Needs and Problem Identification	All	
B. Comprehensive Determination of Types and Kinds of Inventories	All	
C. Format Preparation	All	
D. Public Participation	State	FS, SCS, ERS
III. Inventory of Resources		
A. Soils, Agronomy, Range, Biology, Ecology, and Geology on non-forest lands	SCS	State, Local
B. Archaeological, Historical, and Cultural	State	Local
C. Forestry Inventories	FS	State, Local
D. Economic Base Study and Preliminary Projections	State, ERS	FS, SCS

	<u>Primary</u> ^{1/}	<u>Assisting</u>
E. Land Ownership	SCS	FS, State, Local
F. Land Use by Watershed		
1. Irrigated Cropland	State	SCS, Local
2. Dryland Cropland	SCS	FS, State, Local
3. Irrigation Potential	State	SCS, FS, Local
4. Forestry	FS	State, SCS
5. Rangeland	SCS, FS	State
6. Urban & Builtup	SCS	State, Local
7. Water Areas	State, SCS	FS, Local
G. Flood Plain Analysis	SCS, State	FS, Local
H. Erosion and Sediment Damages	SCS, FS	State, Local
I. Recreation Developments	FS, State	SCS, Local
J. Recreation Potentials	FS, State	SCS, Local
K. Water Resources		
1. Water Yields	SCS, State	FS
2. Water Rights	State, SCS	
3. Water Withdrawals	State, SCS	FS, Local
4. Distribution Losses	SCS	State, FS, Local
5. Net Use by Crops	SCS	State
6. Net Depletions	SCS	State
7. Efficiencies	SCS	State
8. Phreatophytic Water Consumption	SCS	FS, State
9. Ground Water	State	SCS
L. Impaired Drainage	State, SCS	Local
M. Cover Conditions	SCS, FS	State, Local

	<u>Primary</u> ^{1/}	<u>Assisting</u>
N. Temperature and Precipitation		
Data	SCS	FS
O. Streamflow Data	SCS, State	FS
P. Water Storage by Use	State	SCS, FS, Local
Q. Water Storage Potential	State	SCS, FS, Local
R. Water Quality	State	SCS, FS
S. Land Treatment Status	SCS, FS	Local
IV. Economic Base Study and Preliminary Economic Resource Use Projections Report	State, ERS	SCS, FS
V. Reexamine Objectives and Component Needs	All	Local
VI. Planning and Evaluation of Alternatives		
A. Recognition of Alternatives to be Examined	All	Local
B. Set up Objective Accounts	All	
C. Watershed Investigations and Reports	SCS	FS, State, Local
D. Other Project Approaches	State, SCS, FS	Local
E. Group Facility Approaches	SCS	FS, Local, State
F. Water Budget by Basins and Subbasins	SCS, State	FS
G. Economic Appraisal and Projec- tions of Resource Use and Development	ERS	SCS, FS, State

	<u>Primary</u> ^{1/}	<u>Assisting</u>
VII. Plan Development		
A. Appraisal of Alternative Tradeoffs	All	
B. Analysis and Evaluation of Tradeoffs in Light of Multiobjective Concepts	All	Local
C. Preparation of Maps	SCS	FS, State, Local
D. Preparation of Basin Reports	All	
E. Preparation of Appendices	All	

1/ Joint where more than one is listed. "All" includes State, SCS, FS, ERS

ARRANGEMENTS FOR COORDINATION

Inherent in this Plan of Work is the need for coordination and cooperation between local, state, and federal agencies. Overall coordination and cooperative arrangements between state agencies and other agencies outside the USDA shall be provided by the Montana Department of Natural Resources and Conservation. Liaison between agriculturally oriented local groups and other USDA agencies shall be a function of the SCS. The responsibility for liaison within Montana rests with the State Conservationist of the SCS, and the Director of the Montana Department of Natural Resources and Conservation.

Under the functions of liaison and coordination, it is necessary to keep the lines of communication open and clear in order to keep

planning personnel informed, to prevent misunderstandings and to provide opportunity for input for people concerned with the study. It is also necessary to establish the opportunity for face-to-face or technician-to-technician contact for people concerned with gathering and directing input into the plan. A clearance procedure will be developed that will maintain the coordinating function of the Montana Department of Natural Resources and Conservation and still provide the necessary freedom embodied in the technician-to-technician contacts.

Personnel assigned to the Clark Fork of the Columbia River Basin Survey by the three USDA agencies will function as a River Basin Planning Staff under the guidance of the USDA Field Advisory Committee. A USDA River Basin Staff Leader will be assigned to coordinate USDA staff activities. Overall coordination and policy determinations within USDA will be a function of the USDA Field Advisory Committee.

ADMINISTRATION OF THE SURVEY

Survey work of the USDA will be carried out in accordance with the Memorandum of Understanding, dated April 15, 1968, between the Soil Conservation Service, the Forest Service, and the Economic Research Service. Work will be under the direction of the USDA Field Advisory Committee, which has been established to maintain continuous close field working relationships among the three concerned Services. This Committee is composed of Avard B. Linford, Chairman, Montana State Conservationist, SCS; Thomas N. Schenarts,

Region 1 Representative, Region 1, Forest Service; and Clyde E. Stewart, Leader, Northwest Resource Group, Economic Research Service.

The Committee will meet quarterly, at the call of the Chairman, or at the request of any member. They will direct survey activities, consider budgetary needs, review reports and statements by the USDA River Basin Survey Staff, and transact other business pertinent to the survey.

The Field Advisory Committee will review the Plan of Work annually. Revisions necessary to keep the Plan of Work compatible with current instructions will be made, significant changes in the scope, cost, cooperative arrangements, or completion date of the study will be reviewed and considered by the Washington Advisory Committee prior to adoption. The Field Advisory Committee will develop procedures for coordination with other federal departments or agencies and with the State of Montana.

FUNDING

Departmental funds are obtained by direct appropriation and allocations are made to the three agencies at the Washington level. Each agency allocates funds for the survey to its state or regional offices. The FAC makes annual recommendations on the funding amounts required to carry the survey forward.

The following are the budget estimates for the USDA agencies and the State of Montana in accordance with tentative allocations:

<u>AGENCY</u>	<u>FY 72</u>	<u>FY 73</u>	<u>FY 74</u>	<u>FY 75</u>	<u>FY 76</u>	<u>Total</u>
	(In Thousands of Dollars)					
Soil Conservation Service	35	75	150	130	110	500
Forest Service	20	45	50	35	20	170
Economic Research Service	<u>32</u>	<u>34</u>	<u>45</u>	<u>47</u>	<u>41</u>	<u>199</u>
USDA TOTAL	87	154	245	212	171	869
State of Montana	20	60	90	30	15	215

STAFFING

The SCS personnel assigned to the USDA River Basin Survey Staff for the Clark Fork of the Columbia River Basin Survey are stationed in Bozeman, Montana. Forest Service personnel assigned to the study are stationed in Missoula, Montana. ERS personnel will be stationed in Logan, Utah, and Corvallis, Oregon.

Staff technicians, as required for the conduct of the survey, will be assigned by the three agencies. Additional technical assistance will be made available from regular field and staff personnel as needs warrant and funds permit.

PROGRESS REPORTS

The FAC will prepare quarterly reports of progress for transmittal to the USDA Washington Advisory Committee and others as required.

SCHEDULE OF PLANNED ACTIVITIES

The USDA River Basin Staff schedules will be coordinated with those of participating state agencies. The general study schedule developed for completion of the final report in FY 1976 is as follows:

FY 1972--Recruit and assemble USDA River Basin Staff. Develop Plan of Work. Secure needed aerial photography and maps. Prepare detailed work outline within limits of survey, budget, and manpower. Conduct careful conceptualization workshop to determine data needs, forms, uses, sources, collection techniques, time of collection, and responsibilities. Begin collection of biological and ecological data, soils information, and economic data for developing Economic Base Study projections and initial plan formulation within the Basin. Prepare for and start public information and involvement meetings. First overall Basin plan formulation.

FY 1973--Collection of land use, land ownership, irrigable lands, and soils information. Start collection of water yields and depletions, recreation, and fish and wildlife information in Basin. Begin field investigations and surveys on selected potential watersheds.

FY 1974--Reexamine objectives and component needs. Recognition of alternatives to be examined. Set up objective accounts. Evaluate other project approaches. Evaluate group facility approaches. Start water budgets by basins and subbasins. Transmit elements of information requested progressively as gathered by subbasins to State Water Planning Agencies. Complete inventory phase.

FY 1975--Complete field investigations and surveys in the Basin.

Begin compilation of data and appendix reports. Complete watershed investigation reports on potential watersheds. Transmit elements of information requested to State Water Planning Agencies. Analyze, interpret, and correlate the data assembled. Begin draft of final report. Begin draft of appendix.

FY 1976--Continue draft of final report. Review and revise draft.

Complete and publish final report and appendices.

Meetings of the Field Advisory Committee:

The FAC plans to meet each quarter. Other meetings may be called by the Chairman when needed, at a date and place agreeable to the members.

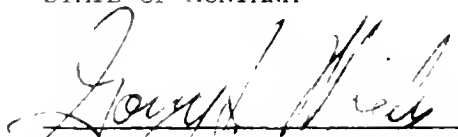
Special interim reports will be prepared as requested by the Field Advisory Committee.

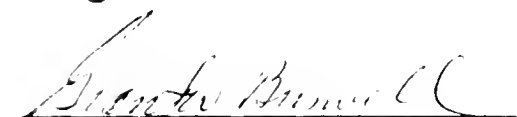
Completion dates for major elements of the survey are as follows:

<u>Element</u>	<u>Completion Date</u>
A. Setting and Recognition of Objectives and Problem Identification	December 1, 1972
B. Complete Format Preparation	July 1, 1973
C. Complete Inventory of Resources	January 1, 1974
D. Complete Economic Base Study Report and Projections	January 1, 1974
E. Reexamination of Objectives and Component Needs	March 1, 1974
F. Recognition and Selection of Alternatives to be Examined	March 1, 1974


G. Setting Up Objective Accounts	June 1, 1974
H. Watershed Investigations and Floodplain Identifications	July 1, 1975
I. Water Budgets by Basin and Subbasins	January 1, 1975
J. Appraisal and Analysis of Alternative Tradeoffs	March 1, 1975
K. Complete Preparation of Map and Figures and Present First Draft of Basin Report to FAC for Review	July 1, 1975
L. Submit Revised Draft of Basin Report to Washington Advisory Committee for Review	October 1, 1975
M. Complete Preparation of Appendices	January 1, 1976
N. Publish Final Revision of Basin Report and Close Out Study	July 1, 1976

STATE OF MONTANA

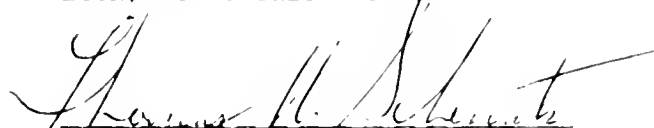

 Director, Department of Natural
 Resources and Conservation

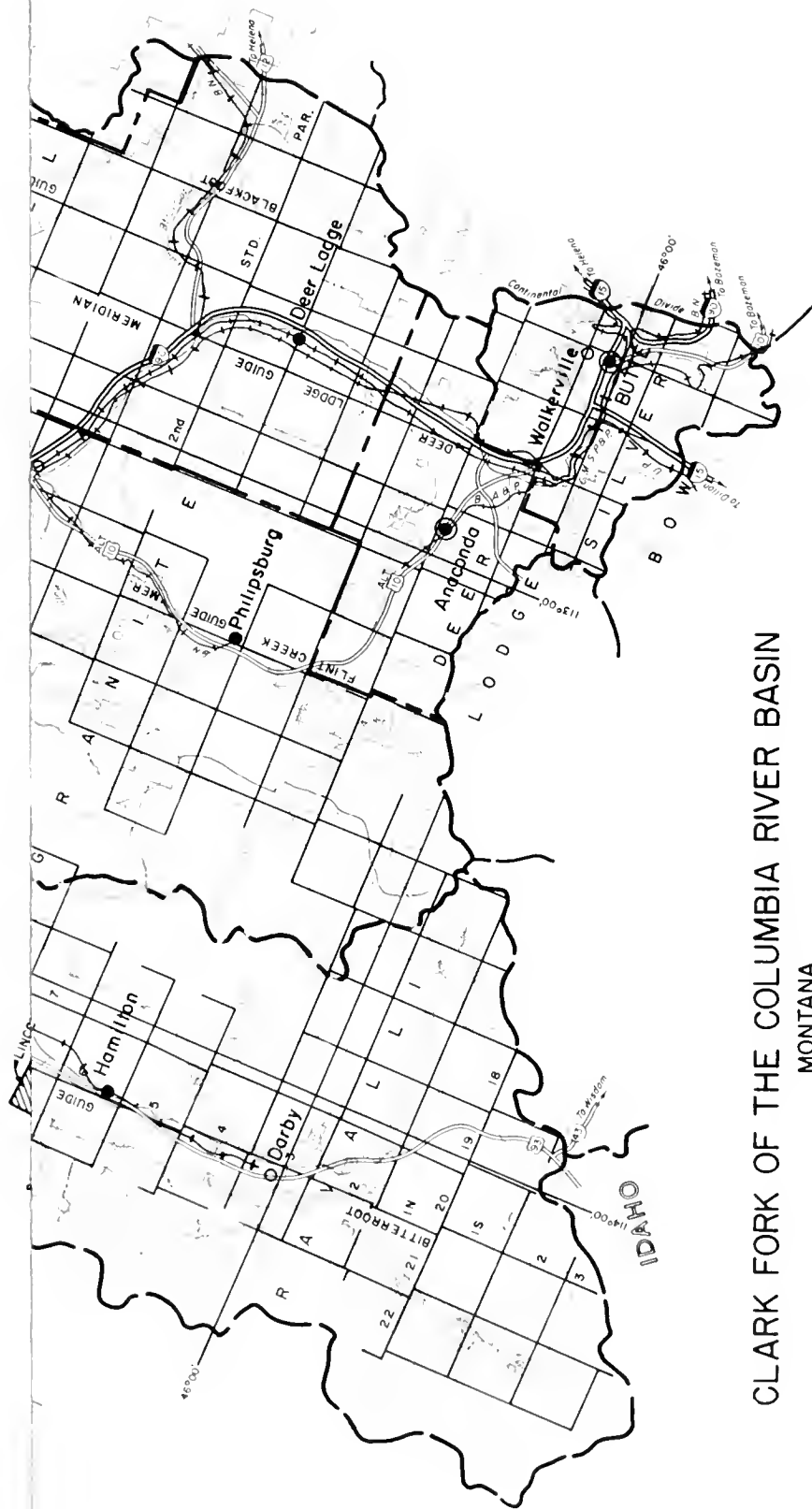

 Administrator
 Water Resources Division
 Department of Natural Resources
 and Conservation

FIELD ADVISORY COMMITTEE


 Chairman
 State Conservationist
 Soil Conservation Service


 Committee Member
 Economic Research Service


 Committee Member
 Forest Service



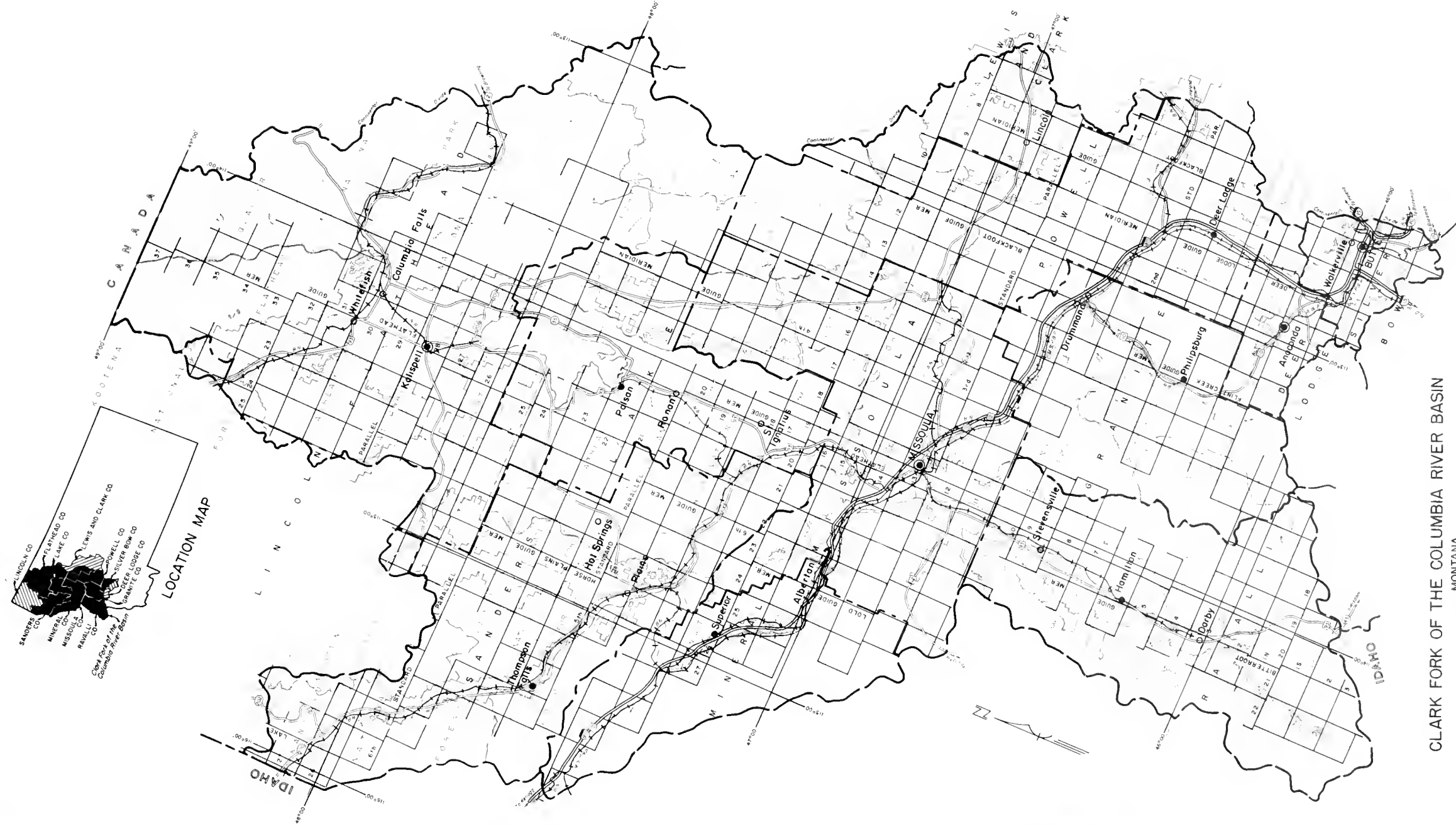
CLARK FORK OF THE COLUMBIA RIVER BASIN

MONTANA

DECEMBER 1971



——— River Basin Boundary



CLARK FORK OF THE COLUMBIA RIVER BASIN
MONTANA

DECEMBER 1971
0 10 20 MILES
SCALE 1:1,000,000

— River Basin Boundary

